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ABSTRACT

The primary purpose of this study was to determine if training in syntactic structures would increase reading performance of junior high school students. A total of 46 students in a predominately white middle class suburban school district who were reading at least two years below grade placement were divided into two groups: 24 students were given syntactic training and 22 students received remedial reading instruction. Pretests and posttests using both the Metropolitan Achievement Test and A Test of Sentence Meaning were administered to all students. Results showed that syntactic training increased reading performance to the same extent as remedial techniques, that both instructional approaches increased scores on the word knowledge subtest to a greater extent than on the reading subtest, and that training students in syntactic structures does not improve understanding of these structures. (Author/JM)

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THE EFFECTS OF SYNTACTIC TRAINING UPON READING PERFORMANCE OF JUNIOR HIGH SCHOOL STUDENTS

A THESIS

SUBMITTED TO THE FACULTY

OF THE GRADUATE SCHOOL OF EDUCATION

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BY

MARGARET GALCHER

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CHAPTER I

THE PROBLEM

Background of the Problem

It has long been recognized that words constitute only one important factor in comprehending what is read. There is the recognition that the complexity of written language was affected by factors such as knowledge of sight words, the number of hard words, and the length of a given sentence. Formulas for determining readability, for instance, rely on one or more of the following elements: some simple or complex measure of vocabulary, sentence length, number of prepositional phrases, number of affixes, and number of syllables per hundred words.

More recently, however, attention has been directed to the patterns in a written sentence and the order in which words appear. By varying the word order or syntax, the complexity of a given sentence can be manipulated. For example, the sentence, "Mother gave the baby the bottle," has a smaller total number of words than the sentence, "The bottle was given to the baby by Mother"; and the former sentence might be determined to be easier to read than the latter based on sentence length. In addition, word order comes into play. Miller (1962) found that passive and

negative sentences took longer to process than active sentences. So even though the surface structures are similar and the sentences have been generated from a single kernel sentence, the sentence with passive construction has greater syntactic difficulty for the reader.

The basic meaning bearing unit of written English, the sentence, is present in all reading materials used by children. Strickland (1962) found that certain syntactic structures were used with greater frequency by children, but that the reading materials she examined conformed to a basic subject, verb, object pattern and did not reflect the diverse syntactic structures in use.

Differing syntactic structures are a feature of standardized silent reading tests. Usually standardized silent reading tests have two parts, a vocabulary subtest and a paragraph comprehension subtest. Most paragraph comprehension tests have graded reading selections which vary in level of difficulty. The difficulty is controlled by the vocabulary, the structure of the sentences, and by the concept load or content of the selections. Reading tests used at intermediate, junior, and senior high school levels have increasingly complex structures; vocabulary and concept load becomes greater; and the sentences become longer and more complex. Paragraphs become longer. With so many variables present, a student's score may reflect a combination of factors that are difficult to isolate (Marcus,

1971).

These standardized silent reading tests have not measured a student's literal comprehension of sentences which is the basis of paragraph development. Recently, a test has been developed to diagnose those elements of syntax within a single English sentence. Marcus (1971) developed a test based on the principle of recovery of deep structure from several sentences with similar surface structure. The test, A Test of Sentence Meaning (ATSM), was developed using the Nelson W. Francis version of structural grammar to isolate types of syntactic structure and using a transformative generative theory of grammar in developing test items for specific skills. Test items were devised by factoring sentences into their underlying kernels and by comparing transformations with equivalent meanings (Marcus, 1971, p. 51). The test incorporated the structures of modification, predication, complementation, and coordination. Marcus found that students in fifth through eighth grade showed incomplete mastery of these structures, but an increasing ability to demonstrate mastery over the grades. The reliability coefficients for ATSM ranged from .95 for grade five to .89 for grade eight, indicating consistency in difficulty commensurate with grade levels.

This study used Marcus' test to diagnose the syntactic competence of seventh and eighth grade poor readers.

Statement of the Problem

The present study was undertaken to discover if instruction in syntactic structures as diagnosed by ATSM will result in increased mastery of these structures and increased reading performance of seventh and eighth grade students. The study investigated the following hypotheses:

Hypothesis 1: There are no significant differences in reading performance between the experimental group and control group as determined by the Metropolitan Achievement Test (MAT).

Hypothesis 2: There are no significant differences between the control group and the experimental group in syntactic structures as measured by ATSM.

Importance of the Study

Takahashi (1975) found that comprehension of syntax is a factor in the poor comprehension of slow readers. Implications for the teaching of reading are numerous if intermediate grade students can demonstrate increased reading comprehension after receiving instruction in recognizing and assimilating syntactic structures. Strickland (1962) found that syntactic structures are introduced in basal readers without regard for reinforcement of these structures through repetition. If knowledge of syntactic structures affects comprehension, all students should receive reinforcement in these structures. Further, materials should be developed to supplement instruction given from

basal readers reinforcing the structures introduced through the grades. The scarcity of these materials suggests that this area has been neglected.

Definition of Terms

Reading Achievement

Reading achievement was determined by using the raw scores obtained on the Total Reading subtest of the MAT. This test is administered to all students in the school district used for the study. An alternate form of this test was used for the posttest.

Intelligence

Intelligence refers to the characteristics measured by the Lorge Thorndike Abilities Test. It was administered to all pupils in the sixth grade in the district used in this study. Records indicating the span of intelligence (average, above average, below average) were available in the permanent record folders of the subjects.

Syntactic Structures

Syntactic structures refers to those devices and patterns within language which are combined into larger structures giving meaning to a sentence. A table showing examples of the four types of English syntactic structure as classified by Francis (1958) appears in Appendix A.

Syn[illegible]ic Training

Following suggestions made by Fagan (1971), teacher-made materials were developed for classroom use. Samples of these materials appear in Appendix B.

Limitations of the Study

The conclusions of this study are limited by the population involved and by the measuring devices used. The population consisted of students in an upper grade school in a suburban middle- to upper-middle class school district composed mainly of white students with average intelligence.

ATSM, one of the measuring devices used, does not cover all possible syntactic structures or their combinations. Takahashi (1975) found ATSM to be long and frustrating for slow readers.

The MAT is a standardized test designed to measure differences over a long period of time. This study measured six month's growth.

Overview of the Study

The following chapters include a review of the literature which places transformational grammar and the concept of deep structure into the current perspective of syntax and reading comprehension, readability and reading comprehension, transformations and reading comprehension, and improvement in performance over age and grade. Chapter

III defines the population, discusses the selection of the tests used, and describes the design of the study. Chapter IV presents data and discusses them in relation to the literature that has been reviewed. The final chapter (V) is a summary and gives suggestions for further research.

CHAPTER II

REVIEW OF THE LITERATURE

This thesis deals primarily with the effect of syntactic instruction upon reading comprehension. The approach to syntax is rooted in the branch of linguistics called transformational grammar. The term linguistics refers to the scientific study of grammar, and the transformationalists are concerned with the theory of language. Unlike 18th century grammarians who formulated prescriptive rules for grammar that dictated usage to be followed by speaker and writer alike, structural grammarians of our century sought to describe language in terms free of human error and subjective judgments. The aim was to make the study of language as objective as the study of physics or chemistry. Structuralists sought to describe how language "is" while transformationalists sought to describe how language "operates." In other words, the difference between states and operations underlies the focus of transformationalists and all other linguists (Thomas, 1965).

A transformational grammar seeks to describe the operations of language. The term "transformational" is an abbreviation of the term transformational generative grammar. Briefly, a generative grammar is one with a finite

number of symbols combined in an infinite number of ways. No speaker of English, for example, could generate all possible English sentences; but all speakers have some method of understanding completely sentences they have never heard before. Sentences are generated by a speaker spontaneously utilizing an internal rule structure which permits evaluation of the grammaticality of a given sentence. A transformation is a rule which rearranges various elements that occur in English sentences.

An example of the complexity of language frequently used by Chomsky follows (Thomas, 1965):

Sentence 1.1 I expected the doctor to examine John.
Sentence 1.2 I persuaded the doctor to examine John.

On the surface, these sentences have similarities; but if changed to the passive voice, they are obviously different:

Sentence 1.1a I expected John to be examined by the doctor.
Sentence 1.2a I persuaded John to be examined by the doctor.

Although the original sentences appear to be similar, mature native speakers of English are aware of a difference in meaning between the apparent surface structure and the meaning conveyed in the base or underlying structure called deep structure.

Deep structure is a component in a three element grammar according to Chomsky (1957). This grammar consists of (a) a deep (or underlying or base) structure component which produces the set of deep structures (and this is

essentially a phrase-structure grammar); (b) a set of transformations which operate on the deep structure; (c) the set of surface structures which are the result of the transformation. Each sentence has a deep structure component and each also has a surface structure which is the result of the transformation acting on the deep structure (Dale, 1972, p. 22).

The deep structure of a sentence is a part of the semantic system of language. It conveys the essential meaning of a sentence while the surface structure is the form in which a particular sentence appears. The surface structure is a phonological system of which syntax, stress, and intonation are parts. Simplified, a transformational grammar would flow: deep structure/meaning → transformation → surface structure/form; and conversely, the flow would be: surface structure/form → transformation → deep structure/meaning.

The Relationship of Surface Structure/ Syntax to Reading Comprehension

Of necessity, all speakers of English employ syntax in both oral and written forms. Without syntax, meaning becomes garbled. A relationship between the structure of oral language and reading ability was found by Strickland (1962). Children in grades two through six who were good oral and silent readers used sentences of greater length. They also made use of moveables and subordination and used

more linguistic patterns. Further, Strickland's study showed that the oral patterns most frequently used by children differed from the patterns found on the sample of pages taken from reading texts. The syntactic structures children used most frequently were not the syntactic structures found in reading texts.

Using this data, Ruddell (1965) wrote six reading passages utilizing patterns of language structure in the same proportional frequency in which they occurred in the oral language of fourth grade children. Cloze comprehension tests were constructed for each passage. Reading comprehension scores on materials utilizing high frequency patterns of oral language structure were significantly greater than comprehension scores on materials using low frequency patterns. Ruddell's use of a cloze procedure to measure comprehension may have affected his results, since deletion of words in unfamiliar low frequency patterns may complicate the reading task.

Subsequently, Tatham (1968) investigated the effect of using multiple choice questions rather than a cloze procedure to measure comprehension of high and low frequency patterns. Comprehension scores of the fourth graders used in the study were higher on materials written with frequently used patterns than on materials written with low frequency oral patterns. In a second study using second and fourth graders, Tatham (1970) measured comprehension by

asking children to read a sentence and draw a line to one of three similar pictures which best matched sentence meaning. Again, more children obtained higher comprehension scores on test material written with patterns that occur frequently in children's oral language than with test material written with patterns that appear infrequently. Fourth graders performed better than second graders on both tests.

Moving from oral language patterns tested using written materials to written language patterns tested using written material, it appears that knowledge of written syntactic patterns seems to affect comprehension. Bormuth (1970) found that linguistic structure is related to comprehension difficulty. In an attempt to identify skills employed in comprehending information signaled by syntactic structure, 25 of 52 types of sentence structure judged most difficult were selected for testing. Two sentences containing each structure were written and then embedded into its own paragraph. Then four types of questions--rote, transform/semantic, and compound--were asked of fourth grade children. Large proportions of the children were unable to demonstrate a comprehension of basic structures by which information is signaled.

Repeated exposure to grammatical meaning appears to strengthen comprehension. Carroll (1970) tested third, sixth, and ninth graders for their knowledge of less

frequent grammatical usage of words that are used in more than one function. Subjects were asked to paraphrase an underlined word in one test to determine the correctness of usage of word with high, low, or anomalous usage. For 90% of the words, difficulty was in comprehending the less frequently used grammatical meaning.

Since school children tend to be grouped by age and interact to a greater extent with their peers than with older or younger children, and if repeated exposure to certain grammatical forms makes them easier to read, then language patterns of a grade level should be self-reinforcing producing differing levels of comprehension. Smith (1970) used patterns of written language produced by children at grades four, eight, and twelve and those of skilled adults. Eleventh graders had the most difficulty with fourth grade writing of all the passages they read; while students in grades four, five, and six found fourth grade passages easiest to read. Students in grades eight through twelve found it was easier to read eighth grade writing than either fourth grade writing or writing by twelfth graders of skilled adults. The research showed that simpler syntax did decrease the number of correct responses by older students. Extreme simplicity of expression (syntax) cannot be considered an asset in materials written for older students. One possible explanation is that older students do not speak or encounter such simple sentences and that they

must alter normal linguistic processing to do so (Smith, 1972).

Readability and Reading Comprehension

Some recent studies (Pearson, 1975; Smith, 1972) have questioned the efficacy of readability formulas. Three types of factors consistently appear in formulas. First, almost all have some measure of word difficulty. Second, about 60% of the formulas use some measure of sentence length. Third, about 30% use some measure of sentence complexity (Klare, 1963). It is implied that altering one or more of the factors will reduce the difficulty people experience in answering questions about the material. Often, mean sentence length is reduced by inserting two-word sentences or by simplifying sentence structure. For example, high interest-low vocabulary books written for use with older poor readers employs this device. Smith (1972) argues that these books should employ syntax about equal to the language of the student for whom the selection is intended.

Pearson (1975) formulated this practical question for his study. "If you have a concept you want to communicate what syntactic form should you use to maximize comprehension?" He reviewed nine studies, one group of four with sentence length as the dependent variable, a group of two with high/low vocabulary as the dependent variable, and one group of three with high/low readability as the dependent

variable. All studies were published before the 1957 publication of Noam Chomsky's Syntactic Structures and yielded indeterminate or no difference findings. Pearson was unable to find a study employing a design to measure the effects of any factor or the effects of their interaction.

Pearson's theoretical base was a model of deep structure which co-varies with a readability model in comparison with the chunk model, conceptual abstraction. Briefly, the chunk model hypothesizes that verbal data is processed in "semantic chunks" rather than in atomistic deep structure components. He conducted three separate experiments using 64 third and fourth graders. Experiment 1 examined causal and adjectival relations. Experiment 2 examined children's preference for various syntactic representations of an idea. Experiment 3 examined children's recall of causal relations. Criterion for materials was that they be similar to written discourse encountered in trade and text books.

Results of experiment 1 showed that every subject responded correctly to every form, and no support for any theoretical position was shown.

In experiment 2, children were asked to rank the form considered best, easiest, and clearest in 1, 2, 3 order and for the worst, hardest, and least clear a rank of 4. Students selected the more cohesive, more heavily embedded forms giving support to the chunk model.

Experiment 3 is similar to Miller's (1962) testing with college students. Students were asked to read a sentence and to remember it for purposes of recall. Pearson finds support for the chunk model unlike Miller who finds support for deep structure. Pearson's findings are tempered by the small sample used (N = 8). His findings support an easing of concern for sentence length and complexity in the middle grades. Medium to high achieving children used in his study seem not only to be able to handle complexity but to actually prefer it. This is in agreement with an earlier study by Nurss (1966) who found that greater structural depth made oral reading more difficult, but not silent reading according to the results of the picture comprehension test.

Readability of a passage may also be affected by the use of various conjunctions. Stoodt (1970), after testing fourth graders for comprehension of conjunctions with a cloze and a multiple choice test, found that there was a significant relationship between understanding conjunctions and reading comprehension.

Transformations and Reading Comprehension

Generally, the presence and difficulty of transformations in a sentence affects the difficulty of a sentence. To review, a transformation is a rule which rearranges various elements that occur in English sentences (Thomas, 1965). Examples of transformations based on the kernel

sentence "Bill hit the ball" are: passive, "The ball was hit by Bill"; negative, "Bill did not hit the ball"; passive negative, "The ball was not hit by Bill"; interrogative forms, "Did Bill hit the ball?" "What did Bill hit?" "Who hit the ball?" and so on. Interrogative forms are usually referred to as "wh" transformations (Miller, 1962).

In order to study transformations experimentally, Miller (1962) used 18 kernel sentences and measured the time required to recognize, analyze, and transform the sentences. His assumption was that the more complicated a grammatical transformation is, the longer it will take people to perform it. The data indicate that negative transforms are performed more quickly than passive transforms and that passive negative transforms require the most time.

Another method of studying transformations was devised by Mehler (1963). Using eight sentences--one a kernel sentence, one negative, one passive, one query, one passive negative, one negative query, one passive query, and one passive negative query--subjects were asked to learn the sentences then to write them out word for word. Subjects were given five trials and sentence order was scrambled each time. Subjects made three main classes of errors: omission, syntactic, and errors including confusing sentences and using extraneous words. The bulk of errors made were syntactic. Subjects recalled the sentence but the syntactic form was altered. The errors people made

could be derived from the correct sentence by omitting or applying syntactic transformations. The concept of deep structure is supported since the general meaning of a message is easier to recall than its exact wording.

In four experiments, Coleman (1964) compared the comprehensibility of different grammatical transformations of a passage. In two experiments, difficult prose was simplified by transforming nominalizations, adjectivalizations, and passives to their active-verb transforms. In the other two, nominalizations alone were compared to active-verb transforms. Forty-eight college students were tested using multiple choice questions. When the mean questions were corrected for guessing, the means were 5.38 for the simplified versions and 4.29 for the originals with a magnitude of improvement of 25.2%.

Gough (1965) tested subject's ability to verify statements made about pictures placed in front of them. He found that as the number of transformations for a form increased, subjects took longer to verify the statement.

The findings of Fagan (1971) seem to indicate that the presence of deletion and the embedding transformations tended to make sentences difficult for children to read. The purpose of his study was to determine if reading comprehension of grades four, five, and six pupils was affected by the number or types of transformations in passages they read. The number of transformations per

sentence ranged from zero to 27. All passages were tested by the cloze technique and were scored using three different methods. His findings that the number of transformations within a sentence did not seem to affect the comprehension difficulty of that sentence did not agree with previous researchers.

An initial list of 27 types of grammatical structures was compiled by Marcus (1971). The list was reduced to 17 structures and was used to develop a test for the purpose of diagnosing specific difficulties with basic syntactic structure. A transformational theory of grammer was used in developing test items by factoring sentences into their underlying kernels and by comparing transformations with equivalent meanings. Marcus found that an interruption of the subject-verb-clause sequence by a relative clause in complex sentences caused more difficulty than if a clause did not interrupt the sentence. Students tested were in grades five through grade eight. Some students showed a lack of understanding of semantic and syntactic meaning of function words, and some did not distinguish between denotated literal meanings and implied meanings. One hundred and two questions comprise this test which was a multiple choice format based on paraphrase. The test, A Test of Sentence Meaning, was used in this study, but was split in half into an odd numbered 51-item pretest and an even numbered 51-item posttest.

Takahashi (1975) used Marcus' test, A Test of Sentence Meaning, to compare the performance of ninth grade slow readers to ninth grade good readers and sixth grade readers on a test of syntactic comprehension. Data indicates that comprehension of syntax is a factor in the retarded comprehension of slow readers. No group in the study entirely mastered the syntactic structures involved. The areas of greatest difficulty were in interruption of subject-verb sequence, pronoun reference, deletions, embedding, and conjunctions. Fagan (1971) found similar areas of difficulty.

Improvement in Performance Over Age and Grade

In general, older children demonstrate greater syntactic ability than younger children. Takahashi (1975), in comparing good ninth grade readers with good sixth grade readers, found evidence that comprehension of syntactic structures increases over the grades. Marcus (1971) found that students did better in each higher grade from fifth to eighth grade even though time was unlimited, the structures "basic" ones, and word knowledge controlled. The average number of correct items for fifth grade was 60 while the average number for eighth grade was 81.

Older students in Smith's (1970) study read consistently better than fourth, fifth, and sixth grades on all levels of writing. In Carroll's (1970) study using

third, sixth, and ninth grades, each succeeding grade did better than the preceding one. Tatham (1970) found that fourth graders outperformed second graders on both frequently used and infrequently used syntactic structures.

Although Fagan (1971) used subjects in the fourth, fifth, and sixth grades, there is no mention of improvement due to age. Similarly, Pearson (1975)--who used third and fourth graders--does not mention improvement with age. All other studies cited used a single grade level of subjects.

Summary

In this chapter, a brief introduction to transformational grammar and the concept of deep and surface structure was given. A brief review of the various categories follows.

1. There apparently is a relationship between surface structure/syntax and reading comprehension. Strickland (1962) found that reading scores on materials using high frequency oral patterns were significantly greater than scores using low frequency oral patterns. Ruddell (1965) and Tatham (1968) agree with this. Bormuth (1970) found that knowledge of written syntactic patterns seems to affect comprehension, and Smith (1970) found that simpler syntax was more difficult for older students to comprehend than writing produced by a peer group. Carroll (1970) found that repeated exposure to grammatical meaning appears to strengthen comprehension.

2. Recent studies have questioned the efficacy of readability formulas. Smith (1972) argues that the high interest-low vocabulary books for older poor readers should employ syntax about equal to the oral language of the student for whom it is written. Pearson (1975) asked, "If you have a concept you want to communicate what syntactic form should be used to maximize comprehension?" His findings support an easing of concern for sentence length and complexity in the middle grades. Children used in his study were able to handle complexity and seemed to prefer it. This agrees with an earlier study by Nurss (1966). Although classes of words are not a part of readability formulas, Stoodt (1970) found a significant relationship between understanding conjunctions and reading comprehension.

3. Generally, the presence and difficulty of transformations in a sentence affects the difficulty of a sentence (Coleman, 1964; Fagan, 1971; Gough, 1965; Marcus, 1971; Miller, 1962). Takahashi (1975) found that comprehension of syntax is a factor in the retarded comprehension of slow readers.

4. Older children demonstrate greater syntactic ability than younger children (Carroll, 1970; Marcus, 1971; Smith, 1970; Takahashi, 1975; Tatham, 1970).

CHAPTER III

PROCEDURE

This chapter will describe the design of the study, define the population used in the study, discuss the selection and construction of the tests used, and list the suggestions of Fagan (1971) used in the development of materials for training.

Design of the Study

R	O_1	X	O_2
R	O_3	X	O_4

R indicates random assignment of pupils (in class groups) to separate treatments. X is the symbol for the independent variables. O symbolizes measuring or testing procedures. Each horizontal row refers to one treatment group. Vertical rows represent simultaneous occurrences (Campbell, 1963). The pretest and posttest mean gain scores were used as dependent variables. The training materials were used as independent variables. A *t* test of mean raw scores on the pretest and posttest was conducted in order to test the major hypothesis. The .05 level of confidence was used as criterion for significant difference.

Population

Seventh and eighth grade students whose raw score on the Metropolitan Achievement Test, Total Reading subtest, Intermediate form G and Advanced form F was between 21 and 56 were used for this study. (A raw score of 21 is equivalent to 3.5 in grade equivalents and a raw score of 56 is equivalent to 5.8 in grade equivalents.) These 46 students read at a level two years below their grade placement and are considered poor readers. All were assigned to Remedial Reading for small group instruction. All have average intelligence.

The population of Freehold Township School District from which these subjects were chosen is predominately white (97.3%), middle class, and suburban. The subjects attend an upper grade school (grades six through eight) that was built 12 years ago. Total population of the township is 13,185 with 3,407 households (Monmouth County Planning Board, 1972). The median age of residents is 25.9 and 34.1% of the population is of school age, from 5 to 19 years. Sixty-seven percent of township residents are high school graduates, and 3.3% of residents have incomes below the poverty level (Monmouth County Planning Board, 1972). Over 50% of the residents commute to jobs in urban areas.

Selection of Tests

Metropolitan Achievement Test (MAT) was the instrument chosen to measure reading level in this study because scores were available to the writer. Each year in May, the complete battery of MAT is administered to all children in the Freehold Township school district. The subjects of this study took Intermediate form G and Advanced form F in May 1975; Advanced form G was used as a posttest in November 1975.

The Total Reading subtest of the MAT is a sum of two scores, Word Knowledge and Reading. The Word Knowledge subtest consists of 50 items which measure vocabulary recognition without surrounding context. Three items of this subtest ask for opposite meanings of words. The Reading subtest consists of seven reading selections with comprehension measured by 45 questions covering four skills: main thought, details, inference, and meaning of words in context. The MAT Total Reading is not a diagnostic instrument (Buros, 1965) although item analysis is computed for each student and is available to teachers in the district.

H. A. Robinson in his review finds that standardization has been scientifically executed (Buros, 1965, p. 797). Experimental forms had been tried with about 27,000 students and selection of final items was done by analysis of items. The test was then administered to 250,000 pupils.

Alternate form reliability coefficient for the Intermediate form G Total Reading subtest is .96. For the Advanced form F Total Reading subtest, the coefficient is .97.

The standard error of measurement for the Intermediate form G Total Reading subtest in terms of raw score is 3.7. For the Advanced form F Total Reading subtest, the standard error of measurement in raw score is 3.5.

Generally, H. A. Robinson finds this test to be one of the best survey tests of reading achievement. "It has been carefully planned, tested and well produced" (Buros, 1965, p. 798). One criticism of the test is that it does not appear to discriminate well among those students reading at ninth grade level or above. In the present study, this is not applicable since the subjects are not students reading at ninth grade level.

A Test of Sentence Meaning (ATSM) was the other measuring instrument used in this study. Syntactic categories for this test were selected by Marcus as described by W. Nelson Francis, a structural linguist. Four categories of syntactic structures by means of which grammatical meaning is indicated follow:

a. Structures of modification consist of two immediate constituents, a head and a modifier.
b. Structures of predication consist of two immediate constituents, a subject and a predicate.
c. Structures of complementation consists of two immediate constituents, a verbal element and a complement.

d. Structures of coordination have two or more immediate constituents, which are syntactically equivalent units joined in a structure which functions as a single unit. (Marcus, 1971, pp. 49-50)

In addition to the Francis classification of the grammatical structure of English, Marcus used a transformational generative theory of grammar to develop test items for specific skills. Test items were culled after factoring the sentences into kernels and comparing them with equivalent sentence meanings (Marcus, 1971, p. 51).

Vocabulary was controlled by using words from the word list of Dale, Thorndike and Lorge, and Rinsland. Lexical content and internal punctuation were controlled.

Within the four structure framework by Francis, 17 structures were selected which were adaptable to a multiple choice format. These structures appear in Appendix A.

The format of test items was based on the ability to discriminate between structures that had the same or different meanings. Four formats were chosen requiring a student to differentiate between (1) equivalent meaning and (2) different meaning. Format 3 asked the student to find two sentences that said something true about a lead sentence. This required the ability to analyze a structure into kernel sentences. Format 4 required that kernel sentences be chosen that gave the equivalent meaning of a lead sentence.

Content validity was established by asking three

linguists to independently evaluate the test items. After evaluation, 19 items were revised and none were omitted.

One hundred and two items are divided into three subtests for purposes of administration. Marcus administered the test to 487 boys and girls in grades five, six, seven, and eight from both disadvantaged and middle class schools. Using the Kuder Richardson Formula 20, reliability coefficients were computed. They ranged from .95 for fifth grade to .89 for eighth grade. For purposes of this study, the test was split in two tests--one composed of the odd-numbered questions and one composed of the even-numbered questions. Each test had 51 items. The reliability of each half was measured using rational equivalence (Garrett, 1970). The half which represented the pretest measured .74. The half which represented the posttest measured .88. This is considered adequate because Garrett points out that rational equivalence is superior to the split half method in that it tends to underestimate the reliability coefficient as found by the split half method.

ATSM was used by Takahashi (1975) to measure the syntactic comprehension of good and poor ninth grade readers and sixth grade readers. Although no subject demonstrated mastery, good readers were able to answer more items correctly. The test was found to be long and frustrating to complete by Takahashi's subjects.

The Criterion for Intelligence

All students in the Freehold Township school district are administered the Lorge Thorndike Abilities Test when in sixth grade. Raw scores and normative data were not available. Terms (average, above average, below average) indicating the broad categories were found in subjects' records. When the records were studied, little difference in intelligence was noted as indicated in Table 1.

TABLE 1

INTELLIGENCE DATA OF PUPILS IN STUDY

N = 46

Treatment Group	N	Above Average	Average	Below Average
Experimental	24	1	22	1
Control	22	0	20	2

Procedure

In September 1975, the group was randomized into a control group of 22 and an experimental group of 24. During the second week of September 1975, both groups took the odd-numbered ATSM. The subjects were told they had unlimited time to complete ATSM.

Using the results of ATSM, a program of instruction was initiated to reinforce areas of syntactic weakness and to acquaint students with the various syntactic structures. Instruction was received during a "Supervised Instruction"

time block each day for one-half hour for a total of 12 hours from September 1975 through November 1975. "Supervised Instruction" is an hour time block when students receive help from classroom teachers, remedial reading, and supplemental teachers. All subjects were assigned to remedial reading and received instruction in groups of six or less. The author developed materials for instruction based on the suggestions of Fagan (1971). Examples for each of Fagan's suggestions appear in Appendix B. The sources for the training material were Gray (1957), Monroe (1970), and Hand (1972). Fagan's suggestions to help build a pupil's facility with printed language follow:

1. Well constructed sentences may be taken from various writings and divided by the teacher into kernel sentences. The students may be asked to combine the kernels to form sentences.
2. Students may be given complex sentences and asked to break them down into their component parts and indicate how the parts are related.
3. Sentences which contain a number of referents may be given to pupils with instructions to replace all referents.
4. Examples of deviant sentence structures may be taken from the children's own writings and used to have children suggest why they are deviant.
5. Pupils may be given practice in eliminating all information in a passage except the "core."
6. Students may be asked to list all the clues concerning a particular linguistic element named by the teacher. (p. 172)

The control group during this period reviewed phonic generalizations and syllabication and used commercial materials such as the Specific Skills series (Barnell Loft), SRA Laboratories and Reading for Understanding kits, and

Scholastic's Sprint Library.

In November, both the experimental and control group took the MAT, Total Reading subtest, Advanced form G. Both groups took the even-numbered ATSM.

CHAPTER IV

FINDINGS AND DISCUSSION

The purpose of this study was primarily to determine if training in syntactic structures would improve reading performance. The secondary purpose was to determine whether understanding of syntactic structure by poor readers could be improved by training. Seventh and eighth graders who were reading two years below grade placement as determined by the MAT, Total Reading subtest, were chosen as subjects. They were given the odd-numbered ATSM in September. Subsequently, the experimental group received 12 hours of instruction in syntactic structure while the control group worked on various reading skills which were a normal part of the reading program. Following instruction, both groups took an alternate form of the MAT, Total Reading subtest and the even-numbered items of ATSM.

Presentation of Data

As explained earlier in this study, the MAT was administered to the total school population at the end of each school year. Since subjects of this study were in different grades, they took different forms of the test. The present seventh graders took Intermediate form G, and the present eighth graders took Advanced form F. The

scores of the seventh grade subjects on the pretest cannot be compared to scores on the posttest (Advanced form G) because the tests are different.

The mean raw scores of the eighth grade subjects in the experimental group can be compared since the subjects took the Advanced form F as a pretest and Advanced form G as a posttest. The pretest mean raw score of 35.1 compares with the posttest mean raw score of 41.7. Eighth graders in the control group scored similarly with a mean raw score of 36.4 on the pretest and a mean raw score of 42.9 on the posttest. When these scores were subjected to a test of significance of difference between means of two small correlated samples, a t test (Smith, 1974, pp. 84-88), the experimental group scored at .01 level of confidence and the control group at the .02 level of confidence. See Table 2.

In order to analyze results further, the subtests of Word Knowledge and Reading were reviewed. This is presented in Table 3. There was a greater gain in the area of Word Knowledge. The control group had a pretest mean raw score of 19.2 and a posttest mean raw score of 24.3 resulting in a mean gain of 5.1. The experimental group's scores were similar. The mean raw score on the pretest was 18.8; and on the posttest, the mean raw score was 24.1 resulting in a mean gain of 5.3. When these scores were subjected to a t test (Smith, 1964, pp. 84-88), both the experimental and control groups scored at the .01 level of confidence.

TABLE 2

A COMPARISON OF STANDARD DEVIATION, MEAN RAW SCORE, RANGE OF SCORES, AND MEAN GAIN ON THE METROPOLITAN ACHIEVEMENT TEST, TOTAL READING SUBTEST OF EIGHTH GRADE SUBJECTS

N = 28

Treatment Group	Range of Scores	Mean Raw Score	SD	Mean Gain	F Ratio	p
Experimental N = 18						
Pretest	22-43	35.1	9.74	6.6	2.78	.05[a]
Posttest	26-66	41.7				
Control N = 10						
Pretest	30-41	36.4				
Posttest	25-58	42.9	6.55	6.5	2.97	.05[b]

[a] $p \leq .05 = 2.11$.

[b] $p \leq .05 = 2.26$.

The Reading subtest scores showed little increase. The experimental group had a mean raw score of 16.3 on the pretest and a mean raw score of 17.7 on the posttest, a gain of 1.4. The control group's mean raw score on the pretest was 17.4 and on the posttest was 18.6, a gain of 1.2. The small differences on the Reading subtest represent a slight and not significant difference. The gains on the Total Reading subtest then were due for the most part to gains on the Word Knowledge subtest.

TABLE 3

A COMPARISON OF THE SUBTEST SCORES OF WORD KNOWLEDGE AND READING ON THE METROPOLITAN ACHIEVEMENT TEST

N = 28

	Word Knowledge					Reading		
Treatment Group	Mean Raw Score	SD	Mean Gain	F Ratio	p	Mean Raw Score	Mean Gain	p
Experimental								
N = 18								
Pretest	18.8	6.16	5.3	3.45	.05[a]	16.3	1.4	NS
Posttest	24.1					17.7		
Control								
N = 10								
Pretest	19.2	4.58	5.1	3.33	.05[b]	17.4	1.2	NS
Posttest	24.3					18.6		

[a] $p \leq .05 = 2.11$.

[b] $p \leq .05 = 2.26$.

There were no significant differences, nor was there indication that training caused improvement when results on the posttest of the ATSM were analyzed. Results are summarized in Table 4. Posttest scores were slightly lower than pretest scores. However, the differences were not significant. It is interesting to note that in both groups one-half of the subjects scored lower on the posttest than on the pretest. This is not surprising for the control group which exhibited a negative attitude toward taking another test. However, it is surprising for the experimental group which vocalized positive feelings and expected to do better after learning about and working with sentences.

Of the 17 syntactic structures on the odd-numbered pretest of ATSM, the item most often answered incorrectly was a combination of structures. On the posttest, combination of structure was again most often incorrect. Examples of the above items will be found in the discussion section.

Discussion

As a result of this study, the first null hypothesis that there are no significant differences in reading performance between the experimental and control group as determined by the MAT, Total Reading subtest is not rejected.

The second null hypothesis that there are no significant differences in syntactic understanding after instruction in syntactic structures as measured by ATSM is not rejected.

TABLE 4

A COMPARISON OF RANGE OF SCORES, MEAN RAW SCORES, MEAN GAIN/LOSS, AND STANDARD DEVIATION OF SCORES ON A TEST OF SENTENCE MEANING

N = 46

Treatment Group	Range of Scores	Mean Raw Score	Mean Gain/Loss	SD	F Ratio	p
Experimental						
N = 24						
Pretest	8-44	25.1	-1.6	6.48	1.17	NS[a]
Posttest	2-42	23.5				
Control						
N = 18						
Pretest	8-44	24.4	-1.8	6.16	1.64	NS[b]
Posttest	8-40	22.6				

[a] $p \leq .05 = 2.07$.

[b] $p \leq .05 = 2.11$.

The question "Will training in syntactic structures increase reading performance?" can be answered positively. The data indicate that there was a mean gain of almost 7 raw score points by the experimental group as measured by the MAT. In grade equivalents, this is a mean gain of 5.2 to 6.2. The control group which received regular remedial reading instruction also made a gain of almost 7 raw score points, from 5.3 to 6.2 in grade equivalents. Equal gains in reading performance were made by both groups.

The experimental group received instruction only in reading sentences and in sentence meaning for the 12-hour training period. Therefore, it can be inferred for this population that instruction in this area results in as much gain as from usual reading instruction comprising phonics and syllabication reviews and use of commercial materials. Thus, it would be accurate to state that training in syntactic structures appears to increase scores on the Total Reading subtest to the same degree that the more traditional remedial reading instruction does.

As originally planned, the amount of instruction time was greater than 12 hours. However, during the course of instruction, the students vocalized restlessness and frustration with working only with sentences. Questions such as "May we work in skill books instead of these sentences?" were common. Since the six suggestions of Fagan (listed in Chapter 3) used as a skeletal lesson plan had

been used and reused, training was terminated and posttesting began after 12 hours of instruction. The attitude of the experimental group was generally positive with children showing enthusiasm and sometimes demonstrating sudden understanding when manipulating complex sentences. It is interesting to note that after the posttesting only two students inquired if they "did better" on the second test than on the first test, indicating overall antipathy to the subject matter.

As mentioned previously, ATSM was divided into two tests and used for pre and posttesting. The odd-numbered items comprised the pretest. The test item that was most frequently incorrect was the sentence:

> Almost immediately after the men had begun their discussion of the student action the leader of the parents, who is not a school official, announced that his group would vote for the new rule that had been suggested by the school principals and teachers.

Students were asked to select two sentences out of five that said something true about the lead sentence. This particular sentence is a combination of structures, and its length might have been a factor hindering syntactic processing. Visual memory may also have been a factor. During the training period, similar sentences of great length were manipulated by the students. The same directions to "say something true" about a sentence were given. Students also practiced putting together true statements to form sentences of great length and complexity.

The results show a mean raw score of 25.1 for the experimental group and a mean raw score of 24.4 for the control group. On the 51-item test, both groups were able to correctly answer less than one-half the items.

The even-numbered items were used as a posttest, and it was administered in November 1975. The control group exhibited negative attitudes during the posttest, while the experimental group had a positive attitude and expected to do well on the test. The test item that was most frequently incorrect was a sentence of great length comprising a combination of structures. Students were asked to choose two sentences out of five which said something true about this sentence:

> Students among the 35 people arrested early Monday for criminal action when the police broke up a 6 hour meeting in the college president's offices were told that they had until 4 P.M. Thursday to give their reasons for their action if they wanted to return to school.

On the posttest, the experimental group had a mean raw score of 23.5 correct items, while the control group had a mean raw score of 22.6 correct items. The mean raw score of both groups was lower on the posttest than on the pretest. These differences were not significant indicating that training in syntactic structures did not for this study result in greater syntactic understanding as measured by ATSM. Moreover, in each group one-half of the group scored lower on the posttest than they did on the pretest. A difference in attitude does not adequately explain this

occurrence. Perhaps the length of time spent on instruction was not enough for students to demonstrate mastery of the structures.

Although both experimental and control groups showed significant differences within groups, there were no significant differences between groups on the posttest. The experimental groups' mean raw score of 41.7 compared with the control groups' mean raw score of 42.9, indicating no significant differences between the experimental and control groups.

Chapter IV presented data and discussed the results of this study. Chapter V will present a summary and give suggestions for further research.

CHAPTER V

SUMMARY AND SUGGESTIONS FOR FURTHER RESEARCH

The purpose of this study was to determine whether training in syntactic structures would increase reading performance. Forty-six students in the Freehold Township school district reading two years below grade placement as determined by the MAT, Total Reading subtest were subjects of this study. Twenty-four students received training in syntactic structures while 22 students received remedial reading instruction. After 12 hours of instruction during six weeks, both groups were retested using an alternate form of the MAT.

On the basis of this study, syntactic training appears to increase reading performance to the same extent that remedial reading techniques did. The mean raw score of eighth grade students in the experimental group on the posttest was comparable to the mean raw score of eighth graders in the control group. Both the experimental and control groups showed growth, but there were no significant differences between groups. A t test of significance for the differences between means was computed on the Total Reading subtest yielding a level of confidence greater than

the criterion of .05.

When the Total Reading subtest scores were analyzed further by obtaining mean raw scores for the Word Knowledge and Reading subtest, the greatest mean gain for both experimental and control groups was in Word Knowledge (a mean gain of five raw score points) while the Reading subtest showed a mean gain of one raw score point. A *t* test of the significance for the differences between means was computed for the Word Knowledge subtest. The level of confidence obtained was greater than the criterion of .05.

Training in syntactic structures does not appear to increase understanding of these structures as measured by ATSM in this study. Forty-six students were administered ATSM in September 1975. There were 51 test items and the experimental group answered a mean of 25.1 correctly while the control group answered a mean of 24.4 test items correctly. The most frequently incorrect item was a combination of structures, a sentence of great length. Using the most frequently incorrect test items and the suggestions of Fagan (1971), instruction was planned and given to an experimental group of 24 students. In November 1975, ATSM (even numbered) was administered to both groups. The mean raw score on the pretest was greater than the mean raw score on the posttest. Of the 51 items, the experimental group answered a mean of 23.5 correctly while the control groups answered correctly a mean of 22.6. In addition,

half of the students in both experimental and control groups scored lower on the posttest than they had on the pretest. On the posttest, the most frequently incorrect sentence was (as on the pretest) a combination of structure, a sentence of great length. Generally, ATSM's function as a diagnostic instrument is questionable.

Suggestions for Further Research

The present study could have been enhanced by the added factor of time. Over a period of a year, if the syntactic training material were integrated with the usual remedial reading materials, two factors which hindered this study could have been eliminated. Students in this study vocalized negative feelings when confined to working solely with sentences. Over the period of a year, this training might be given one day a week eliminating this focus. Secondly, a longer period of time might work positively in conjunction with the MAT because it maximizes its function when measuring performance over a longer period.

This study might be replicated using content material in the training. Materials gleaned for use in the present study were of a "reading" focus. If content materials had been used, the added factors of interest, applicability and immediate function could have come into play. It is possible that transfer of training might have been greater.

Syntactic patterns of the various standardized

Reading tests employed by the schools might be analyzed using Marcus' structures to categorize the patterns. Research should be done to see what patterns appear. This information could be used to further research and to analyze the syntactic patterns in the textbooks available at the junior high school level. A comparison of patterns found in Reading tests and in textbooks would aid in critical evaluation and selection of both textbooks and Reading tests. Such analyses could also give teachers more insights on how to help students improve reading comprehension.

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APPENDIX A

EXAMPLES OF FOUR TYPES OF SYNTACTIC STRUCTURE AS CLASSIFIED BY FRANCIS (1958)

EXAMPLES OF FOUR TYPES OF SYNTACTIC STRUCTURE

AS CLASSIFIED BY FRANCIS (1958)

I. Structures of Modification

Prepositional phrase as noun, verb, or sentence modifier
Complex sentence where relative clause modifies subject
Complex sentence where relative clause modifies object
Complex sentence where relative clause modifies object of preposition
Complex sentence with two relative clauses

II. Structures of Predication

Passive voice in simple sentences
Passive voice in complex sentence where relative clause contains passive
Recognition of transformations of nominalizations into active verbs

III. Structures of Complementation

Direct object/indirect object sequence
Direct object/objective complement sequence
Subjective complement embedded as modifier

IV. Structures of Coordination

Sentence with coordination of phrases
Sentence with coordination of subordinate clauses
Sentence with coordination of independent clauses
Elliptical structures of coordination

V. Combination of Structures

Included clauses as modifiers, subjects, or complements
Combinations of structures

APPENDIX B

SPECIMENS OF MATERIALS USED FOR SYNTACTIC TRAINING

GROUP ONE

1. The Adirondack Forest Preserve contains over two million acres.
2. In this forest preserve.
3. Camping is allowed free of charge.
4. Marked by signs.
5. These sites are easily reached.
6. You should register with the caretaker.
7. If you intend to spend any time at one of them.
8. Lake George Village is located in this region.
9. Conveniently close to many of the camp sites.
10. Because of the demand.
11. Several private companies rent equipment to campers.
12. Fishing, swimming, and boating.

GROUP TWO

1. With less than a dozen cadets.
2. West Point was opened on July 4, 1802.
3. All appointments were then made by the President.
4. Upon recommendation of the nominating authorities.
5. Today, approximately 2500 cadets.
6. Some of them sons of men who died serving in the Armed Forces in World War I or World War II.
7. Including many sons of members of the armed services.
8. There are also four appointed from the Republic of the Philippines.
9. Because so many apply.
10. And the requirements are so high.

11. The entrance examinations are very difficult.

12. Candidates, between the ages of 17 and 22.

13. Upon graduating with a degree of bachelor of science.

14. He is commissioned as a second lieutenant.

15. And must serve in the Army or the Air Force for at least four years.

From Hand, J. S., Harsh, W., Ney, J., & Folta, B. Power in English. River Forest, Ill.: Laidlaw Bros., 1972.

* * *

The following are original sentences generated by subjects of this study.

A. The small, brown squirrel scurried up the tree.

The squirrel scurried up the tree.

The squirrel was small and brown.

B. We have many books in our library such as encyclopedias, atlas, gazette, and most of all fiction books.

In the library there are many books.

In the library there are encyclopedias, atlas, gazette, and most of all fiction books.

C. Our schedule for our classes at school changes every 10 weeks.

We have a schedule in our class.

Our schedule changes every 10 weeks.

The following are workbook pages from Basic Reading Skills, 1970, which were used by the subjects in this study.

Each underlined pronoun refers to a person or thing named in the sentence. Write the letter of each pronoun in front of the word or words for which the pronoun stands.

1. "Mrs. Tate, please let Ben and Carrie come with us to the movies," said Mrs. Keys. "Mr. Keys and I will take good care of them."

a. us
b. I
c. them

_____Mr. and Mrs. Tate
_____Mrs. Keys
_____Mr. and Mrs. Keys
_____Ben and Carrie

2. "Which music class is larger, yours or ours?" the twins asked Wendy.

a. yours
b. ours

_____the twins'
_____the twins and Wendy's
_____Wendy's

3. While Brad was holding a camera, he saw a large sea gull land close enough for him to take a picture of it.

a. him
b. it

_____the camera
_____the sea gull
_____Brad

4. When Mr. Post gave the little boy a dime for a candy bar, he said, "Push the button for the one you want."

a. he
b. one
c. you

_____candy bar
_____dime
_____the little boy
_____Mr. Post

* * *

Read each sentence and the question after it. Write Yes or No on the line after the question.

1. The boys paid no attention as the man quietly explained

why the paint should be stirred before it was used.

Does this sentence mean that the boys listened to the explanation quietly? _____

2. The forest ranger warned that the water in the spring was impure.

   Does this sentence mean that the water was unsafe to drink? _____

3. The plane was delayed three hours by bad weather on the east coast.

   Does this sentence mean that the plane was late in arriving? _____

4. "Tim, the important thing is not how long your story is, but how good it is," the teacher said to the student.

   Does this sentence mean that Tim had to write a long story? _____

* * *

Two of the three sentences in each box mean about the same thing. Read the numbered sentence. Then read sentences a and b and place a check beside the one that means almost the same as the numbered sentence.

1. The team had two more wins under its belt after last weekend.

   _____ a. The team had two more wins on its record after the weekend.

   _____ b. The team won two more games wearing new belts.

2. The almost extinct eastern mountain lion continues to lose ground.

   _____ a. Land continues to be taken away from the rare eastern mountain lion.

   _____ b. The almost extinct eastern mountain lion continues to become less common.

3. Martha watched the feathery, gray smoke drift across the river.

_____ a. Martha watched bits of gray smoke blow across the river.

_____ b. Martha watched some feathers and smoke drift across the river.

4. In winter the mountaintops were hooded in fluffy white.

_____ a. In the winter the mountains wore coats with fluffy white hoods.

_____ b. During the winter the mountaintops were covered with snow.

* * *

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High School: Cathedral High School
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Professional Experience

1968-1973: Sixth Grade Teacher
Freehold Township School District

1973-1976: Remedial Reading Teacher
C. T. Barkalow School
Freehold Township School District
Stillwell Corner Road
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COURSE WORK FOR MASTER'S DEGREE IN READING

AT RUTGERS UNIVERSITY

Summer 1973		Instructor
15:299:564	Remedial Reading	Dr. Zelnick
15:320:565	Lab in Remedial Reading	Dr. Zelnick
Fall 1973		
15:290:501	Introduction to Tests and Measurements	Dr. Geyer
15:290:540	Introduction to Learning	Dr. Gillooly
Spring 1974		
15:299:561	Foundations of Reading Instruction	Dr. Fry
Summer 1974		
17:610:521	Materials for Children	Ms. Greene
Fall 1974		
15:290:513	Introduction to Early and Middle Childhood	Dr. Arnold
15:310:500	Curriculum and Instruction	Dr. Campanella
Spring 1975		
15:299:566	Seminar Reading Research and Supervision	Dr. Kling
Summer 1975		
15:290:519	Introduction to Exceptional Children	Dr. Strickart
Fall 1975		
15:251:532	Transformational Grammar	Dr. Barone
Spring 1976		
15:299:599	Masters Thesis Research	Dr. Zelnick